

Estimating Energy Expenditure

What types of activities did you do yesterday? When this

question is asked, people often don't remember time spent vacuuming, raking leaves, climbing stairs, or even watching television. This can be a problem for scientists, health care practitioners, and physicians as they try to make health assessments and recommendations for life-style changes. This kind of information is important, since physical activity is a vital part of preventing and managing diseases like high blood pressure, diabetes, and obesity.

"Many things contribute to difficulty and inaccuracy in measuring physical activity in people," says chemist Joan M. Conway, with the ARS Diet and Human Performance Laboratory in Beltsville, Maryland. A main problem is that people may not report all of their physical activities on questionnaires. This can lead to errors in estimating energy expenditures. "Physical activity includes occupational activities, leisure activities, household tasks, social activities, and physical fitness activities," Conway notes.

To help solve this problem, Conway, ARS colleague James L. Seale, and university collaborators conducted a study to test how well activity records and questionnaires estimate daily energy expenditures.

They found that it's possible to use activity records to estimate energy expenditures in groups, but they are not reliable for individuals. Questionnaires were less reliable than activity records. Poor questionnaire design, overestimating time spent moving and using up



energy, and a too-small sample size can cause

errors, even in group estimates.

There is a more accurate method, but it's high-tech. Scientists use a test with doubly labeled water to determine energy expenditure in people. The water contains heavy forms of hydrogen and oxygen called isotopes, which can be traced in the urine or blood to determine how much of the

isotope is still present in the body. From this measurement, scientists can determine how much energy a person used during the study and then calculate average daily energy expenditure. But this test is expensive, so it's not practical to use with large groups.

"Future studies should address redesigning current methods, or developing new techniques to assess daily physical activity," says Conway. "These types of studies are important because obesity in Americans is increasing, and nutrition and life-style decisions are based on this information."—By **Tara Weaver-Missick**, ARS.

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